21st Century

OFFICE OF

BUILDING TECHNOLOGY,

STATE AND COMMUNITY PROGRAMS

STRATEGIC PLAN

Buildings for the 21st Century

OFFICE OF ENERGY EFFICIENCY AND RENEWABLE ENERGY
U.S. DEPARTMENT OF ENERGY

Vision

VISION:

A HEALTHIER, MORE PROSPEROUS FUTURE THROUGH THE WISE USE OF ENERGY IN BUILDINGS AND COMMUNITIES.

Mission

MISSION:

IN PARTNERSHIP WITH INDUSTRY AND GOVERNMENT, BTS DEVELOPS, PROMOTES, AND INTEGRATES ENERGY TECHNOLOGIES AND PRACTICES TO MAKE BUILDINGS MORE EFFICIENT AND AFFORDABLE AND COMMUNITIES MORE LIVABLE.

Introduction

This strategic plan is in direct response to the call by a broad array of interested parties, including Congress, for the Office of Building Technology, State and Community Programs (BTS) to reduce fragmentation and increase focus. It is also timely and important because of the immediate and significant challenges and opportunities within the building sector. This plan establishes new vision and mission statements and directs BTS to a new way of doing business, characterized by:

- Stronger and more effective partnerships with industry and States
- Jointly developed government-industry technology roadmaps
- Competitively selected and peer-reviewed projects
- Establishment of BTS as the integrator of cost-effective, technology-based, energy-efficient products and practices
- Customer-focused, highly productive, and results-driven orientation

Although there have been many successes, we recognize that BTS has many small programs whose lack of coordination results in duplication of efforts and lost opportunities. The programs in BTS have evolved over 20 years and have been shaped by different legislation[1] and administration priorities. Traditionally, the programs have worked with their own narrowly defined group of stakeholders. We also recognize we have not sought out new research partners through systematic competition and have not undertaken consistent, thorough external evaluations of our research and programs.

These factors, combined with the fragmentation that characterizes the U.S. building industry, have led to small, isolated programs with little external or internal integration, inadequate focus, and no overarching strategy. Through implementation of this strategic plan, we will integrate current and future building programs and provide a framework for our activities.

This plan represents the beginning of a process that will increase the focus of our programs, establish clear priorities, and broaden input on what we do and how we do it. This process has several elements. First, we will perform sound analysis to identify trends in energy use and forecast the impact of program options. Second, we will solicit stakeholder involvement to help us identify opportunities, set priorities, review goals, and expand our partnerships. Third, we will submit our programs to continuous external and internal evaluation.

Overall, the strategic plan repositions BTS to be more effective in reducing energy consumption in our Nation's homes, offices, schools, and other buildings. It commits us to a more participatory process with industry, the research community, and key stakeholders in all activities. It builds on the experience we gained redesigning our appliance standard-setting processes and our recent success working with the window industry.

This plan outlines our goals for saving energy, three key strategies to accomplish these goals, and our commitment to improving how we do business. It concludes by describing several immediate actions we will take to begin its implementation: the development of technology roadmaps; the establishment of a peer review process; and the issuance of the first competitive solicitation — for industrialized housing. It also describes the initial organizational steps already being undertaken and the additional actions we will take to strengthen the organization and align it to help make this plan successful.

Situation Analysis

THE UNITED STATES CONSUMED ROUGHLY 90 QUADRILLION BTU (QUADS)[2] OF PRIMARY ENERGY IN 1995.[3] EIGHTY MILLION BUILDINGS CONSUMED 36% OF THIS TOTAL, OR 33 QUADS. MORE THAN $220 BILLION IS SPENT EACH YEAR IN THE U.S. TO PROVIDE HEATING, COOLING, LIGHTING, AND RELATED SERVICES FOR OUR BUILDINGS.

Between now and 2010, we anticipate 18.4 million new homes and over 21.5 billion square feet of new commercial buildings. Because of projected growth in the number of buildings and the energy intensity within them, energy consumption and associated economic and environmental costs will likely continue to escalate. Given the environmental and economic impact of current energy consumption and projected growth in the building sector, the success of this strategic plan is critical to meeting the Administration's overall strategy of increasing the efficiency and productivity of energy use while limiting environmental impacts.

Energy consumption in buildings is a major cause of acid rain, smog, and global warming, accounting for:

- 47% of U.S. sulfur dioxide emissions
- 22% of nitrogen oxide emissions
- 35% of carbon dioxide emissions

This situation analysis provides an overview of energy use in the building sector. It also describes some of the challenges involved in bringing energy efficiency[4] to the building sector. It concludes by discussing the major trends that we will monitor in developing our programs.

Energy Use

Energy is used to provide a variety of services in buildings — including temperature and humidity control, lighting, water heating, and power to operate appliances and other miscellaneous electrical devices. (See Figures 1 and 2).[5] Space conditioning (heating, cooling, ventilation) represents the largest energy use in buildings, fully 45% of total use. The next largest single usage is for lighting (18%). However, as Figures 1 and 2 indicate, a marked difference exists between energy use patterns in residential and commercial buildings. While lighting represents less than 10% of energy demand in residences, over 30% of energy use in commercial buildings is for lighting applications.

1995 RESIDENTIAL BUILDING END-USE SPLITS

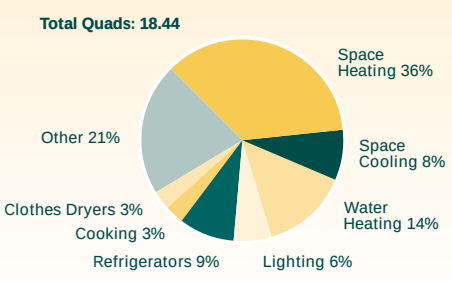

Figure 1

1995 COMMERCIAL BUILDING END-USE SPLITS

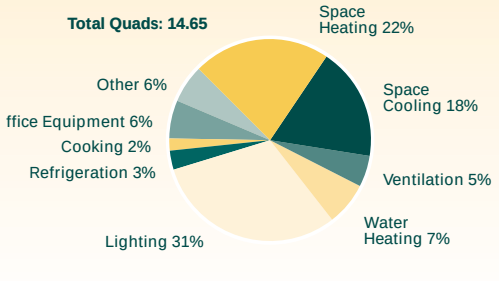

Figure 2

Building Sector

The value of the building sector was over 8% of the Gross Domestic Product in 1995, or $600 billion. This includes nearly $400 billion in new construction, and $200 billion for building renovation, modifications, and repair. These investments should be highly energy efficient.

The building industry encompasses literally thousands of different businesses and millions of individual decision makers. The resulting fragmentation of the industry separates developers, designers, builders, utilities, engineers, and occupants from one another as they pursue objectives which often are at cross-purposes. Also, unlike the transportation sector that has a few major firms responsible for final assembly and product delivery, the building sector has thousands of builders who put together individual components into a complete structure. As a result, product integration is less than optimal and the number of decision makers to influence is much greater.

Another consequence of this fragmentation is the fact that the building industry spends relatively little on research and development. While this is due in part to the cyclical nature of the market, the industry is dominated by a relatively large number of small firms that can ill afford research programs, and that rarely conduct coordinated or integrated research. As a result, research and development expenditures for the building sector as a whole are less than one half of one percent of sales, while the national average in other industries is closer to 3.5%.

Beyond fragmentation and low R&D investment, there are additional market barriers to the adoption of energy efficiency technologies and practices. These include:

- The lack of a life-cycle perspective in purchasing decisions
- The lack of reliable and verifiable building product performance information
- Mixed price signals between building owners and tenants
- Codes that impede adoption of new technologies
- The length of the replacement cycle for building components and materials

Trends

The following list highlights a few of the most critical trends that we will be considering in the development of our programs.

- Utility restructuring adds a high level of uncertainty to the marketplace. It may affect energy prices, utility investments in R&D and energy efficiency programs, and incentives for renewable resources.
- Globalization of the marketplace is expanding the range of available technologies and offering new markets for U.S. technologies.
- Environmental concerns about climate change and air and water pollution offer opportunities for efficiency to be part of the solution to these problems.
- Demographics are changing. The U.S. population is aging and moving to the Sunbelt and coastal regions. People continue to move to the suburbs, and the at-home work force is increasing. These factors are changing how we use energy.
- Technological changes are rapidly increasing computing power, the degree of automation, and ease of communication. These changes have the potential of affecting every facet of energy usage and offering stunning advances in building controls and operation.
- Building energy use is changing with more cooling loads and the introduction of more natural gas technologies and other advanced technologies, such as fuel cells and micro-cogeneration.
- Real estate ownership patterns are changing. Home ownership is increasing. The ownership of commercial buildings is consolidating into fewer firms.
- Liability and insurance concerns relating to products and professional services have increased.
- Awareness and concern for the indoor environmental quality of our buildings have grown. Public expectations are increasing beyond just thermal comfort.

The consequences of the trends we have identified are not clearly known. Some may represent opportunities, others will make it more challenging to meet our goals.

Goals

WE HAVE ESTABLISHED AN AMBITIOUS YET REALISTIC SET OF ENERGY-SAVING GOALS, CONSISTENT WITH ANTICIPATED MARKET TRENDS AND FUNDING LIMITATIONS.

Establishing realistic but ambitious goals is very difficult, and many comments have been made about what goals we should institute. At a theoretical high, individual buildings can become net generators of energy and produce more energy than they use. At the upper end, we know that with the application of cost-effective new technologies and practices new homes and commercial buildings can achieve 50% savings in energy consumption over current practices. In addition, renovation of existing homes and buildings can achieve 20% in energy savings. If this theoretical potential were achieved in all buildings by 2010, the U.S. would save 10 quads each year. Ten quads of annual energy savings would reduce building energy consumption by one-fourth and save $60 billion in energy costs.

However, we know it is unrealistic to expect the 81 million existing and 21 million anticipated new buildings by 2010 to achieve those levels of energy savings. In addition, we recognize our resources will have certain funding limits, and current market barriers will be difficult to overcome. Consequently, we have developed goals consistent with our anticipated funding and anticipated market transformation trends. With those provisos, the table at left details our energy-saving goals as a direct result of our work.[6]

Figures 3 and 4 (see facing page) show the impact of BTS programs on energy consumption for the building sector. Figure 3 reflects all buildings constructed after 1999.

BTS Energy-Saving Goals

Energy-saving goals as a direct result of BTS work are:	An amount equal to:	As an illustration, this level of savings would require reducing energy use:
2 quads per year by 2010	All the energy used annually in the State of Virginia	• By 50% in 4.8 million of the anticipated 18.4 million new homes, and 5.6 billion of the anticipated 21.5 billion square feet of new commercial floor space. • By 20% in 16.4 million of the 98.7 million existing homes, and 7.9 billion of the 61.3 billion square feet of existing commercial floor space.
5 quads per year by 2020	All the energy used annually in the States of New York and Colorado combined	• By 50% in 14.6 million of the anticipated 34.3 million new homes, and 20.0 billion of the anticipated 35.1 billion square feet of new commercial floor space. • By 20% in 36.6 million of the 94.4 million existing homes, and 13.7 billion square feet of 51.7 billion square feet of existing commercial floor space.

Benefits

Based on a program-by-program analysis conducted for the Government Performance and Results Act (GPRA), we anticipate the following benefits from the FY 1999 budget request. An annual Federal investment of $300 million will save consumers a cumulative $65 billion by 2010 and over $320 billion by 2020. Lowering home energy bills makes housing more affordable, placing the American dream of home ownership within the grasp of more citizens. The average energy cost burden of low-income (average yearly income of $11,245) households is 14.6% of income, or more than four times the national average. Lowering operating costs increases profits for building owners and tenants. Figure 5 shows consumer cost savings from BTS programs.

If we have the resources to accomplish these ambitious goals, we will reduce carbon emissions by over 45 million metric tons in 2010, and by 124 million metric tons in 2020, as shown in Figure 6.

Addressing energy issues also provides non-energy benefits such as comfortable and healthy indoor environments, improved worker productivity, and reduced on-site construction waste. Other benefits include increased competitiveness for the building industry and economic activity in communities.

BTS IMPACT ON THE ENERGY CONSUMPTION OF EXISTING BUILDINGS

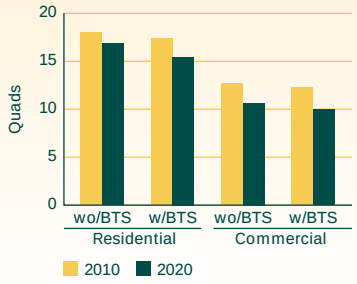

Figure 3

BTS IMPACT ON THE ENERGY CONSUMPTION OF NEW BUILDINGS

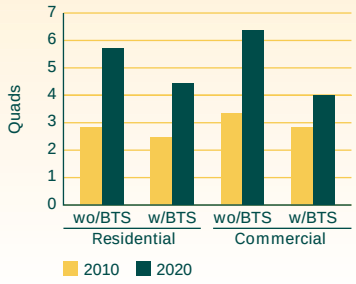

Figure 4

CONSUMER COST SAVINGS FROM BTS PROGRAMS

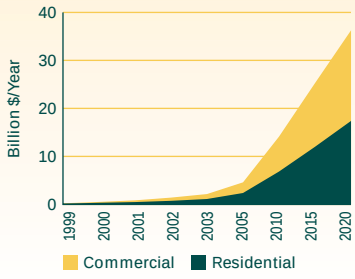

Figure 5

CARBON REDUCTIONS FROM BTS PROGRAMS

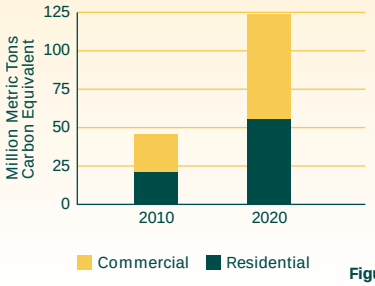

Figure 6

Strategies

BTS WILL PURSUE THREE INTERRELATED STRATEGIES TO ACHIEVE THE TARGETED ENERGY-SAVING GOALS. THE CROSSCUTTING BENEFITS OF THESE STRATEGIES WILL OPTIMIZE FEDERAL INVESTMENTS AND HELP TO ACCELERATE THE DEPLOYMENT OF ENERGY EFFICIENCY TECHNOLOGIES AND MEASURES IN THE MARKETPLACE.

We have identified three strategies to achieve our goals:

- Accelerate the introduction of highly efficient technologies and practices through research and development.
- Increase the minimum efficiency of buildings and equipment through codes, standards, and guidelines.
- Encourage the use of energy efficiency and renewable energy technologies and practices through technology transfer[7] and financial assistance.

Our strategies have evolved from careful consideration of our goals and a thorough situation analysis. Building programs will be designed to capitalize on the interactive, synergistic benefits of our three implementation strategies. The three build on each other, and their crosscutting nature should make us stronger than we could be if our strategies remain isolated. A balanced portfolio of research and development will establish the technology base for future energy savings. Appliance and building standards and guidelines will eliminate the most inefficient existing technologies in the market. Technology transfer efforts and financial assistance will speed the introduction of new technologies and the widespread use of highly efficient technologies already on the market and provide valuable feedback for future R&D.

1. Accelerate the introduction of highly efficient technologies and practices through research and development. The level of research funded in the building industry is less than 1% of sales, and building energy research is only a fraction of that. A recent report on energy research and development by the President's Committee of Advisors on Science and Technology and a report on energy technologies prepared by five Federal laboratories stressed the importance of our role in building research. Our efforts must leverage the scant public- and private-sector resources available. Under this strategy, we will conduct a balanced portfolio of high-risk and applied research to accelerate the introduction of energy-efficient building technologies and practices.

THREE INTERACTIVE, SYNERGISTIC IMPLEMENTATION STRATEGIES

To achieve the targeted energy-saving goals, we will pursue the following three strategies:

- **Accelerate the introduction of highly efficient technologies and practices through research and development.**
- **Increase the minimum efficiency of buildings and equipment through codes, standards, and guidelines.**
- **Encourage the use of energy efficiency and renewable energy technologies and practices through technology transfer and financial assistance.**

Research is conducted in two areas: components and systems integration. Research and development of individual building components (envelope and equipment/appliances) provide the technical basis for significant energy savings in buildings. Systems integration research and development activities analyze building components and systems and integrate them so that the overall building performance is greater than the sum of its parts.

Existing components can be made more energy efficient and less costly. New, advanced component technologies could be twice as efficient as conventional components and still meet the challenging reliability and cost requirements in buildings. Used in retrofit application, these technologies provide one of the best opportunities to increase energy efficiency in existing buildings. These buildings will dominate energy consumption in the building sector for the next several decades.

Building system integration is analogous to the process used in the production of airplanes and automobiles. Using a systems approach can result in higher performance throughout the building life cycle: site selection, design, construction, commissioning, operation and maintenance, renovation, demolition, and replacement.

In collaboration with stakeholders and customers, we will establish our research portfolio in several key areas:

Building components

- Appliances
- Cogeneration
- Envelope technologies
- Heating, ventilating, and air-conditioning (HVAC) equipment
- Lighting

Building system integration

- Building system controls/automation
- Component/system interaction
- Design/construction

To begin the collaborative process with industry in these priorities, we will develop jointly agreed-upon technology roadmaps in the following areas:

- Lighting
- Heating and cooling
- Windows
- Insulation
- Whole buildings in the commercial sector
- Whole buildings in the residential sector

See the Next Steps implementation plan on page 11 for details on how we will get started.

2. Increase the minimum efficiency of buildings and equipment through codes, standards, and guidelines. This strategy addresses our continuing legislative requirements to improve the minimum efficiency for buildings by implementing energy efficiency codes, standards, and guidelines for building equipment, appliances, and federally owned buildings. These codes and standards must be technologically feasible and cost effective on a life-cycle basis. By eliminating the most inefficient technologies and building practices, we complement the other strategies which develop and promote advanced, highly efficient technologies and practices. National standards also provide manufacturers with a single set of requirements rather than an array of potentially conflicting State and local regulations.

We assist national building code organizations, States, professional groups (e.g., the American Society of Heating, Refrigerating, and Air-Conditioning Engineers), and industry efforts in developing, revising, upgrading, and implementing standards, guidelines, and model energy codes.

In implementing this strategy, we will build upon the successful process-rule experience of several years ago. We will use a collaborative approach in which manufacturers and other key stakeholders identify opportunities and activities that can achieve or exceed the potential results of regulatory programs. To improve the efficiency of buildings, we will:

- Lead a comprehensive effort to establish minimum efficiency codes, standards, and guidelines for equipment, appliances, and Federal buildings.
- Assist States and building industry organizations in developing, updating, and revising building standards and codes.

3. Encourage the use of energy efficiency and renewable energy technologies and practices through technology transfer and financial assistance. Often there is a significant time lag between laboratory research and the widespread use of resulting technologies. In addition, consumers lack reliable information about underutilized technologies already on the market. Many barriers thwart the adoption of research results, including a hesitancy to accept unproven new technologies, lowest first-cost procurement policies, tax disincentives, and a lack of credibility about professed benefits. To overcome these barriers, we will work with partners to speed the adoption of energy efficiency and renewable technologies in the marketplace.

Our partners are central to bridging the gap between research and widespread utilization. Some of the major stakeholders in this endeavor are State governments, local entities, utilities, retailers, and manufacturers. They have established infrastructures, networks, and delivery mechanisms to reach the ultimate consumers, and their relationships with consumers give them credibility.

We will exchange information with our stakeholders to ensure the feedback critical to the development of successful next-generation research and regulation. We support public- and private-sector activities as voluntary alternatives to regulatory programs. In order to accelerate the adoption of energy-efficient technologies and practices, we will:

- Educate decision makers by providing unbiased, accurate information on performance, reliability, purchasing, and financing for energy-efficient products and services.
- Demonstrate the performance, cost, and reliability of new technologies.
- Increase application of technology and best practices for cost-effective weatherization of homes for low-income families.
- Award targeted grants to States and communities to support their activities to promote increased energy efficiency and the use of renewable energy resources.

How We Do Business

WE ARE COMMITTED TO A NEW WAY OF DOING BUSINESS AND HAVE DEVELOPED THE FOLLOWING PRINCIPLES TO GUIDE THE IMPLEMENTATION OF OUR STRATEGIES.

We recognize our employees as the most important resource to meet our goals. Investing in the knowledge, skills, and talents of BTS employees ensures creative and timely execution of tasks, commitment to our vision and mission, and cost-effective implementation of all programs. We will continuously enhance our staff's capabilities through training and education.

We use teams, where appropriate, to manage program and support activities. We form teams that are designed to achieve our goals. We believe a team approach that is flexible and dynamic will promote better integration among programs. We will commit the resources required for successful team implementation.

We communicate effectively, both internally and with our stakeholders. We are developing a communication plan. We will educate our customers and stakeholders on the actions we are taking and our progress. We will inform internal and external customers and stakeholders of our actions, directions, and services.

We are committed to involving our customers, partners, and stakeholders. We will work with them from the planning phase, through implementation, to the evaluation phase of our programs.

DOE CORE VALUES

We are committed to implementing DOE's core values:

- **We are customer-oriented.**
- **We respect the environment.**
- **People are our most important resource.**
- **We value creativity and innovation.**
- **We are committed to excellence.**
- **We work as a team and advocate teamwork.**
- **We recognize that leadership, empowerment, and accountability are essential.**
- **We pursue the highest standards of ethical behavior.**

We seek partnerships with public- and private-sector organizations. To leverage scarce resources, we will work with people and organizations who bring energy-efficient technologies and practices to the market. We will work with other DOE programs and offices to complement our research and to implement our strategies. We will work with our Federal partners, including the Department of Housing and Urban Development, the Environmental Protection Agency, the National Institute of Standards and Technology, and others.

We recognize the value of our State and local partners. They are active participants in the planning and implementation efforts to bring energy-efficient technologies and practices into wide use throughout the country.

We bring a wealth of scientific and technical talent through the National Laboratory system to assist the private sector. The DOE laboratory system has unique expertise in building technology. It offers members of academia and private industry the opportunity to test prototypes, products, and materials and discuss technical problems and potential solutions.

We are careful stewards of taxpayer dollars. We maximize the use of competitive solicitations. Competitive solicitation is the process by which Federal needs for research projects are proffered for bids by interested research facilities, one or more of which is then selected via a formal review of proposals against predetermined standard criteria. This emphasis brings excellence to our programs independent of organizational affiliation, and is an appropriate strategy for management of public funds.

We ensure the high quality and relevance of our research and technology programs. We conduct technical and economic analyses to identify energy-saving opportunities, assess new technologies, and estimate the impact of program options. These analyses cover factors such as energy performance, economics, environmental impact, and application requirement. We also will have a consistent and independent peer-review process for all programs.

Next Steps

REFLECTING OUR COMMITMENT TO A NEW WAY OF DOING BUSINESS, WE ARE TAKING IMMEDIATE ACTION TO IMPLEMENT THE STRATEGIC PLAN. THE FOLLOWING STEPS ARE ALREADY UNDER WAY.

Implementation Team. Internally, a BTS Implementation Team has been established to coordinate major aspects of implementation. The team is helping develop and implement the three strategies identified in this Strategic Plan. Each strategy will have a specific implementation plan and will influence the thinking of the Organization Design Team as they reshape the organization. The Implementation Team will be responsible for coordinating, monitoring, and evaluating progress toward successful implementation.

Organization Design. To begin the process of reshaping our organization, we have already made an important change: one person has been assigned to head our two R&D offices. Building Systems and Building Equipment will be better coordinated. For a more complete approach, an Organization Design Team has been established and is already reviewing the current organizational structure. It will develop several organization options for consideration, options that will more effectively implement the Strategic Plan. The team incorporates actions that will build on the strength of our employees and enhance their skills in implementing the plan. An organizational framework will be developed and, with the participation of the Union and Human Resources offices, a new organization will be implemented.

DEFINITION OF A TECHNOLOGY ROADMAP

A technology roadmap is a comprehensive strategy developed to achieve goals. It includes:

- **Identification of current and needed technologies**
- **Barriers to development and adoption of new technologies**
- **Options and pathways to accelerate acceptance of new technologies**
- **Priorities for technology options and research**
- **Major milestones**
- **Evaluation**

Peer Review. A peer-review process will be established and implemented throughout the organization to ensure that our science is sound. The process will build on other Departmental experience, such as the work conducted by Energy Research with the participation of academics, National Academy of Sciences members, and other unbiased, technically knowledgeable participants. In addition, we will explore earlier BTS peer reviews and more recent examples, such as the peer review of the BTS lighting program in November 1997. Such reviews are important to ensure that our science is sound and to provide opportunities to evaluate the progress of our implementation efforts.

Technology Access. To deliver our information and services more effectively, a team has been developed to ensure easy access to all our products. The team will address overall deployment and communications, including target audiences, allies for delivering services, conferences, workshops, publications, displays, and related outreach to help customers make informed decisions on their energy options.

Technology Roadmaps. Working directly with our stakeholders, industry, and States, we will incorporate all three strategies in the development of six initial technology roadmaps:

- Lighting
- Heating and cooling
- Windows
- Insulation
- Whole buildings in the commercial sector
- Whole buildings in the residential sector

Already we have begun the process to develop the technology roadmaps in the above areas. This roadmapping process will initially identify short-term R&D and deployment actions that have industry and government buy-in and can be implemented as early as possible. Shortly thereafter, we will develop joint mid- and long-term actions. We will initiate additional roadmap projects during 1999, depending on resources available.

Competitive Solicitations. As part of our new way of doing business, we will seek increased funds for competitive solicitations. This will allow us to select research partners based on competitive factors such as energy and dollar impact, likelihood of success, consistency with our technology roadmaps, matching funds, etc.

To begin the process, we will select a topic of ongoing research that is at a propitious point to seek new performers. A competitive solicitation will be issued for research to develop designs and manufacturing processes that will support the production of marketable, industrialized housing. As other existing research comes to a logical point, we will issue new competitive solicitations. Our FY 1999 budget request includes specific funding for broad-based competitive solicitations keyed to the roadmaps.

Budget Submissions. By fiscal year 2000, our budget will more fully incorporate the outcome of the organizational evaluation, roadmapping, and peer-review processes undertaken in 1998. We have already begun to simplify and streamline the budget in our FY 1999 request. It has cut by a third the number of key activities and consolidated some programs. FY 1999 is a transition year toward a much more understandable and focused budget.

End Notes

[1] Authorizing legislation includes the Energy Policy and Conservation Act (1975), the Energy Conservation and Production Act (1976), the Department of Energy Organization Act (1977), the Energy Tax Act of 1978, the National Energy Policy Conservation Act (1978), the Powerplant and Industrial Fuel Use Act of 1978, the Energy Security Act (1980), the National Appliance Energy Conservation Act of 1987, the Renewable Energy and Energy Efficiency Technology Competitiveness Act of 1989, and the Energy Policy Act of 1992.

[2] Throughout this document, a quad refers to a quadrillion Btu, which is the typical amount of energy consumed annually by three million Americans.

[3] According to the Energy Information Administration (EIA) Annual Energy Outlook (1997), the residential (18.43 quads) and commercial (14.33 quads) sectors totaled 32.76 quads in 1995 out of a total 90.93 quads of primary energy use.

[4] For purposes of this document, the terms ”energy-efficient“ and ”energy efficiency“ mean the efficient use of conventional sources of energy and optimal use of renewable energy.

[5] The end-use splits represented in Figure 2 differ from those reported in the EIA Annual Energy Outlook, 1997. This chart includes data for industrial buildings which are not reported by EIA. In addition, energy for “District Services” (heating and cooling) and “Other Fuels” (heating), lumped by EIA under “other,” is attributed to space conditioning. Finally, the statistical adjustment of 1.6 quads required for the Annual Energy Outlook to be consistent with the State Energy Data System has been deleted from “Other.”

[6] These savings are based on careful analysis of the existing portfolio of programs and initiatives as part of the Government Performance and Results Act (GPRA). The baseline year for energy consumption and new/existing buildings comparison is 1999.

[7] Technology Transfer consists of efforts and activities intended to result in the utilization of innovations by the private sector, Federal, State, and local governments, and other users. These activities may include, but are not limited to, direct technical assistance, market transformation activities (partnering in RD&D, licensing and patent activities, and identifying markets and users), and information dissemination.

Buildings for the 21st Century

BUILDINGS THAT ARE MORE ENERGY-EFFICIENT, COMFORTABLE, AND AFFORDABLE ... THAT'S THE GOAL OF DOE'S OFFICE OF BUILDING TECHNOLOGY, STATE AND COMMUNITY PROGRAMS (BTS).

TO ACCELERATE THE DEVELOPMENT AND WIDE APPLICATION OF ENERGY EFFICIENCY MEASURES, BTS:

- CONDUCTS R&D ON TECHNOLOGIES AND CONCEPTS FOR ENERGY EFFICIENCY, WORKING CLOSELY WITH THE BUILDING INDUSTRY AND WITH MANUFACTURERS OF MATERIALS, EQUIPMENT, AND APPLIANCES

- PROMOTES ENERGY/MONEY SAVING OPPORTUNITIES TO BOTH BUILDERS AND BUYERS OF HOMES AND COMMERCIAL BUILDINGS

- WORKS WITH STATE AND LOCAL REGULATORY GROUPS TO IMPROVE BUILDING CODES, APPLIANCE STANDARDS, AND GUIDELINES FOR EFFICIENT ENERGY USE

- PROVIDES SUPPORT AND GRANTS TO STATES AND COMMUNITIES FOR DEPLOYMENT OF ENERGY-EFFICIENT TECHNOLOGIES AND PRACTICES

December 1998

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